	Application No.	Applicant(s)
Notice of Allowability	10/676,467	XIAO ET AL.
	Examiner	Art Unit
	Victor J. Taylor	2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to <u>October 01, 2003</u>.

2. ☒ The allowed claim(s) is/are <u>1-35</u>.

3. ☐ The drawings filed on _____ are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the
            International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
        Paper No./Mail Date <u>10</u>.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date <u>10</u>

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☐ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

Drawings

1.   The drawings are objected to under 37 CFR 1.83(a). The drawings must show

every feature of the invention specified in the claims. Therefore, the informal drawings

with the hand drawn figures and lettering must be replaced with new formal drawings.

The drawings filed on October 01, 2003 are acceptable subject to the correction of the

informalities as indicated in the hand drawn figures and images that are not clear and

are of poor quality as found in the informal drawings. These corrected features must be

shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

reply to the Office action to avoid abandonment of the application. Any amended

replacement-drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet,

and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the

applicant will be notified and informed of any required corrective action in the next Office

action. The objection to the drawings will not be held in abeyance.

Prior Art

2.   The prior art made of record and not relied upon is considered pertinent to

applicant.

I. Art A of Tasci et al., US 5,563,513 in class 324/359 is cited for the method of

determining formation resistivity patterns using resistivity measurements using the

electromagnetic imaging device in figure 1 and delineating anomalous resistivity

patterns associated with oil and gas traps. He further teaches a method of mapping

anomalous resistivity patterns associated with hydrocarbon accumulations in lines 1-5

of column 2. He further discloses the apparatus 10 with means for transmission along

the horizontal axis X with receiver means 26 with equation processed using the

computer in lines 1-64 of column 5 an d 6 with means to move and detect vertical

magnetic data and in time the detects the changes at depth in line 15 of column 6 and

discloses the tri directional X, Y, Z orientation of the various depth points of space 54 in

the volume 10 in figure 2. He further teaches a technique using the Archie's Law in line

40 of column 4 with the computation processes 28 in the computer in line 5 of column 6.

II. Art B of Dasgupta et al., US 6,868,037 in class 367/054 is cited for the method

of Tomography modeling the near surface layers of the 3-component seismic data S1 in

figure 6 and further teaches the X space and Y space at the plurality of Z depth space in

figure 9. He further teaches detailed modeling of the near surfaces of 3D surface

seismic data in lines 30-35 of column 2. He further teaches using SWD data that

corresponds to depth point space in line 30 and teaches means of using the

tomography inversion algorithm and the equation 3 in lines 30-65 to process the data in

column 7. He further teaches the slowness vector in the velocity field in line 55 and

further discloses the borehole with the cross correlation computation means 100 in

figure 1.

Allowable Subject Matter

3.   Claims 1-33 are allowed.

4.   The following is an examiner's statement of reasons for allowance:

The method and apparatus for inversion processing of wellbore logging data in a

selected pattern space by constructing a data model defined by a plurality of measured

conductivity parameters with steps for determining the values for a first subset and a

second subset of a plurality of parameters into the selected pattern space and providing

for the construction the data model using the claimed combination of limitation sets is

not found in the cited art of record.

I. The method in claim 1 for constructing a data model defined by a plurality of

parameters with computer computations for forming the inversion model with method

step limitations for "collecting a plurality of field measurements with each of the plurality

of field measurements bearing an indirect relationship to a first subset of the plurality of

parameters"…[and] with steps for "transforming the collected plurality of field

measurements into a selected pattern space"…[and/or] in combination with the

particularly claimed steps wherein "the determining values for the first subset of the

plurality of parameters from the collected plurality of field measurements after the

transformations of the collected plurality of the field measurements into the selected

pattern space"...[and] in combination with the step for "constructing the data model

using the determined values for the first subset of parameters" to construct the inversion

model to produce the determination of the formation parameters and determine the

hydrocarbon saturation is not found in the cited art of record.

The prior Art A of Tasci teaches the method of determining the formation

resistivity patterns by using resistivity measurements and using the electromagnetic

imaging device in figure 1 and computational processes for delineating the anomalous

resistivity patterns that are associated with the oil and the gas traps. He further teaches

a method for mapping the anomalous resistivity patterns that are associated with the

hydrocarbon accumulations see lines 1-5 of column 2. He further teaches the apparatus

10 and the means for transmission of signals along the horizontal axis X. He further

teaches the receiver means 26. He teaches computational computer processes using

the equation and teaches the processed data by using the computer in lines 1-64 of

column 5 and 6. He teaches the means to move and detect the vertical magnetic data

and in time he detects the changes at depth see line 15 of column 6. He further

discloses the tri directional and the X, Y, Z orientation of the various depth points of

space 54 in the volumn10 in figure 2. He further teaches a technique using the Archie's

Law in line 40 of column 4 with the computation processes 28 in the computer in line 5

of column 6.

The prior Art B of Dasgupta teaches the method for Tomography modeling of the

near surface layers of the 3-component seismic data S1 in figure 6. He further teaches

the X space and the Y space at the plurality of the Z depth space in figure 9. He further

teaches the detailed modeling of the near geophysical surfaces of the 3D surface

seismic data in lines 30-35 of column 2. He further teaches using the SWD data

obtained from the borehole corresponding to the depth point space in line 30. He further

teaches the means for using the topographic inversion algorithm and discloses the use

of equation 3 in lines 30-65 to process the data in column 7. He further teaches the

slowness vector in the velocity field in line 55 and further discloses the borehole with the

cross correlation computation means 100 in figure 1.

Therefore, the prior art Tasci et al., and The prior art of Dasgupta et al., in

combination or alone does not teach the present limitation of the claimed combination

limitation.

It is these limitations expressed in each of these claims and not found, taught, or

suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 2-11 are dependent on the allowed independent claim 1 and are allowed

at least for the reasons cited above.

II. The method in claim 12 for constructing a data model defined by a plurality of

parameters with method step limitations for "collecting a plurality of field measurements

with each of the plurality of field measurements bearing an indirect relationship to a first

subset of the plurality of parameters and a direct relationship to a second subset of the

plurality of parameters"...[and] with steps for "estimating the values for the second

subset of parameters from the collected plurality of field measurements"...[and] with the

particularly claimed steps for "transforming the collected plurality of field measurements

into a selected pattern space"...[and/or] in combination with the particularly claimed

steps wherein "the determining values for the first subset of the plurality of parameters

from the collected plurality of field measurements after the transformations of the

collected plurality of the field measurements into the selected pattern space"...[and] with

the step for "determining in a measured space the values for the second subset of the

plurality of parameters from the collected plurality of field measurements and the

determined values for the first subset of parameters...[and] in combination with the step

for "constructing the data model using the determined values for the first subset of

parameters and the determined values of the second subset of the plurality of

parameters" to construct the inversion model to produce the determination of the

formation parameters and determine is not found in the cited art of record.

The prior Art A of Tasci teaches the method of determining the formation

resistivity patterns by using resistivity measurements and using the electromagnetic

imaging device in figure 1 and computational processes for delineating the anomalous

resistivity patterns that are associated with the oil and the gas traps. He further teaches

a method for mapping the anomalous resistivity patterns that are associated with the

hydrocarbon accumulations see lines 1-5 of column 2. He further teaches the apparatus

10 and the means for transmission of signals along the horizontal axis X. He further

teaches the receiver means 26. He teaches computational computer processes using

the equation and teaches the processed data by using the computer in lines 1-64 of

column 5 and 6. He teaches the means to move and detect the vertical magnetic data

and in time he detects the changes at depth see line 15 of column 6. He further

discloses the tri directional and the X, Y, Z orientation of the various depth points of

space 54 in the volumn10 in figure 2. He further teaches a technique using the Archie's

Law in line 40 of column 4 with the computation processes 28 in the computer in line 5

of column 6.

The prior Art B of Dasgupta teaches the method for Tomography modeling of the

near surface layers of the 3-component seismic data S1 in figure 6. He further teaches

the X space and the Y space at the plurality of the Z depth space in figure 9. He further

teaches the detailed modeling of the near geophysical surfaces of the 3D surface

seismic data in lines 30-35 of column 2. He further teaches using the SWD data

obtained from the borehole corresponding to the depth point space in line 30. He further

teaches the means for using the topographic inversion algorithm and discloses the use

of equation 3 in lines 30-65 to process the data in column 7. He further teaches the

slowness vector in the velocity field in line 55 and further discloses the borehole with the

cross correlation computation means 100 in figure 1.

Therefore, the prior art Tasci et al., and The prior art of Dasgupta et al., in

combination or alone does not teach the present limitation of the claimed combination

limitation.

It is these limitations expressed in each of these claims and not found, taught, or

suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 13-26 are dependent on the allowed independent claim 12 and are

allowed at least for the reasons cited above.

III. The apparatus in claim 27 for determining at least one characteristic of a

subsurface formation comprising the apparatus of "a logging tool having a transmitter

and at least one receiver array for acquiring the geophysical measurements related to

the subsurface geophysical formation"...[and] with the "computing device coupled to the

logging tool with the computing device programmed to execute software to "transform

the acquired geophysical measurements into a selected pattern space""...[and] with the

program steps to "calculate in pattern space a subset of indirect parameters for the

subsurface formation from the transformed geophysical measurements" to construct the

inversion model to produce the determination of the formation parameters and

determine is not found in the cited art of record.

The prior Art A of Tasci teaches the method of determining the formation

resistivity patterns by using resistivity measurements and using the electromagnetic

imaging device in figure 1 and computational processes for delineating the anomalous

resistivity patterns that are associated with the oil and the gas traps. He further teaches

a method for mapping the anomalous resistivity patterns that are associated with the

hydrocarbon accumulations see lines 1-5 of column 2. He further teaches the apparatus

10 and the means for transmission of signals along the horizontal axis X. He further

teaches the receiver means 26. He teaches computational computer processes using

the equation and teaches the processed data by using the computer in lines 1-64 of

column 5 and 6. He teaches the means to move and detect the vertical magnetic data

and in time he detects the changes at depth see line 15 of column 6. He further

discloses the tri directional and the X, Y, Z orientation of the various depth points of

space 54 in the volumn10 in figure 2. He further teaches a technique using the Archie's

Law in line 40 of column 4 with the computation processes 28 in the computer in line 5

of column 6.

The prior Art B of Dasgupta teaches the method for Tomography modeling of the

near surface layers of the 3-component seismic data S1 in figure 6. He further teaches

the X space and the Y space at the plurality of the Z depth space in figure 9. He further

teaches the detailed modeling of the near geophysical surfaces of the 3D surface

seismic data in lines 30-35 of column 2. He further teaches using the SWD data

obtained from the borehole corresponding to the depth point space in line 30. He further

teaches the means for using the topographic inversion algorithm and discloses the use

of equation 3 in lines 30-65 to process the data in column 7. He further teaches the

slowness vector in the velocity field in line 55 and further discloses the borehole with the

cross correlation computation means 100 in figure 1.

Therefore, the prior art Tasci et al., and The prior art of Dasgupta et al., in

combination or alone does not teach the present limitation of the claimed combination

limitation.

It is these limitations expressed in each of these claims and not found, taught, or

suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 28-35 are dependent on the allowed independent claim 27 and are

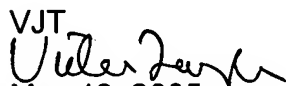allowed at least for the reasons cited above.

Conclusion

5.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Victor J. Taylor whose telephone number is 517-272-

2281. The examiner can normally be reached on 8:00 to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

VJT
May 12, 2005

MICHAEL NGHIEM
PRIMARY EXAMINER